

REMARKS/ARGUMENTS

Favorable reconsideration of this application is requested in view of the above amendments and in light of the following remarks and discussion.

Claims 1-21 are pending. Claims 1, 12, 13, and 14 are amended. Claim 21 is newly added. Support for the amendments to Claims 1 and 14 can be found at page 13, line 25 – page 14, line 13 of the specification, for example. Support for the amendment to Claim 12 is self-evident. Support for the amendment to Claim 13 can be found at page 11, lines 9-18 of the specification and in Figs. 1 and 2, for example. Support for newly added Claim 21 can be found at page 19, line 25 – page 20, line 12, for example. No new matter is added.

In the outstanding Office Action, Claim 1 was rejected under 35 U.S.C. § 102(e) as anticipated by Steger (U.S. Patent Pub. 2005/0056622, herein “Steger”). Claims 1, 5, 10, 11, 13, 14, and 19 were rejected under 35 U.S.C. § 102(e) as anticipated by Hoffman (U.S. Patent Pub. 2004/0159287, herein “Hoffman”). Claims 1, 5, 10-14, and 19 were rejected under 35 U.S.C. § 102(b) as anticipated by Dhindsa et al. (U.S. Patent No. 6,391,787, herein “Dhindsa”). Claims 2-8, 1-17, and 20 were rejected under 35 U.S.C. § 103(a) as obvious over Hoffman. Claims 2-8, 15-17, and 20 were rejected under 35 U.S.C. § 103(a) as obvious over Dhindsa. Claims 9 and 18 were rejected under 35 U.S.C. § 103(a) as obvious over Hoffman or Dhindsa in view of Tong et al. (U.S. Patent Pub. 2004/0083975, herein “Tong”).

TRAVERSAL OF ANTICIPATION REJECTIONS

Regarding the rejection of Claim 1 as anticipated by Steger, that rejection is respectfully traversed by the present response.

Amended Claim 1 recites:

A plasma processing apparatus comprising:
a plasma processing chamber;

a susceptor installed within the plasma processing chamber, the susceptor being made of a conductive material;

an electrostatic chuck formed on the susceptor for mounting thereon a substrate to be processed;

a ring member directly disposed on the susceptor to surround a periphery of the substrate to be processed with a gap therebetween when the substrate to be processed is mounted on the electrostatic chuck; and

a lower ring body placed below the substrate to be processed and the ring member,

wherein when the substrate to be processed is mounted on the electrostatic chuck, the lower ring body is placed below the periphery of the substrate to be processed and an inner circumference of the ring member.

Thus, the present invention as recited in amended Claim 1 is directed to a focus ring employed in a plasma processing apparatus. In particular, the focus ring is used in a plasma etching on a substrate to be processed, e.g., a semiconductor wafer. The focus ring includes a ring member and a lower ring body. The ring member is **directly disposed on the susceptor made of a conductive material**. Further, **the lower ring body is placed below a periphery of the substrate to be processed and an inner circumference of the ring member**.

In contrast, Steger describes an apparatus for the compensation of an edge ring. In Steger, most of the edge ring (102) is disposed on a ceramic ring (110). Further, the edge ring (102) is positioned between a wafer (104) and a coupling ring (108) vertically (see Figs. 1 and 2). Thus, Steger does not disclose that a ring member is directly disposed on a susceptor made of a conductive material, and that a lower ring body is placed below a periphery of the substrate and an inner circumference of the ring member. Accordingly, Applicants respectfully submit that amended Claim 1 patentably distinguishes over Steger for at least the reasons discussed above.

Regarding the rejection of Claims 1, 5, 10, 11, 14, and 19 as anticipated by Hoffman, that rejection is respectfully traversed.

As discussed above, amended independent Claim 1 recites a focus ring that includes a ring member and a lower ring body. The ring member is directly disposed on the susceptor made of a conductive material. Further, the lower ring body is placed below a periphery of the substrate to be processed and an inner circumference of the ring member.

Amended independent Claim 14 recites substantially similar features to those discussed above regarding amended independent Claim 1.

In contrast, Hoffman describes a plasma reactor with overhead RF source power electrode. As shown in Fig. 1, a semiconductor ring (115) is disposed on a dielectric ring (120). Accordingly, Hoffman does not disclose that a lower ring body is directly disposed on a susceptor made of a conductive material. Further, Hoffman does not disclose a lower ring body placed below a substrate. Accordingly, Applicants respectfully submit that amended independent Claims 1 and 14 patentably distinguish over Hoffman for at least the reasons discussed above.

Claims 5, 10, 11, and 19 each depend from either Claim 1 or Claim 14 and patentably distinguish over Hoffman for at least the same reasons as the claims from which they depend.

Regarding the rejection of Claim 13 as anticipated by Hoffman, that rejection is respectfully traversed by the present response.

Claim 13 recites:

A plasma processing apparatus comprising:
a plasma processing chamber;
a susceptor installed within the plasma processing chamber;
an electrostatic chuck formed on the susceptor for
mounting thereon a substrate to be processed; and
a ring member disposed to surround a periphery of the
substrate to be processed with a gap therebetween,
wherein a ratio of an impedance per unit area of the ring
member to that of the substrate to be processed is equal to or less
than about 5.

Accordingly, a plasma processing apparatus or a focus ring includes a ring member disposed to surround a periphery of a substrate to be processed. A ratio of impedance per unit area of the ring member to that of the substrate is equal to or less than about 5.

In contrast, Hoffman does not make mention of an impedance of a ring member at all. Accordingly, Applicants respectfully submit that Claim 13 patentably distinguishes over Hoffman for at least the reasons discussed above.

Regarding the rejection of Claims 1, 5, 10-14, and 19 as anticipated by Dhindsa, that rejection is respectfully traversed by the present response.

As discussed above, amended independent Claims 1 and 14 recite a focus ring that includes a ring member and a lower ring body. The ring member is directly disposed on the susceptor made of a conductive material. Further, the lower ring body is placed below a periphery of the substrate to be processed and an inner circumference of the ring member.

In contrast, Dhindsa describes a stepped upper electrode for plasma processing uniformity. In Dhindsa, an edge ring (17) is disposed on a coupling ring (18) made of quartz. Accordingly, Dhindsa does not disclose a ring member directly positioned on a susceptor made of a conductive material. Further, Dhindsa does not disclose a lower ring body placed below a substrate to be processed and the ring member.

Accordingly, Applicants respectfully submit that amended independent Claims 1 and 14 patentably distinguish over the cited references for at least the reasons discussed above.

It is also respectfully submitted that Claims 2-11 and 15-19, directly or indirectly depending from Claims 1 or 14, are allowable for the same reasons indicated with respect to the independent claims and further because of the additional features recited therein.

Regarding the rejection of independent Claim 12 as anticipated by Dhindsa, that rejection is respectfully traversed.

Claim 12 recites that an electrostatic chuck is located below a substrate to be processed and a ring member.

In Dhindsa, however, an electrostatic chuck (16) is located below only a substrate (15), and not the edge ring (17). Accordingly, Dhindsa does not disclose all of the features recited in amended Claim 12, and Applicants respectfully request that the rejection be withdrawn.

Regarding the rejection of independent Claim 13 as anticipated by Dhindsa, that rejection is respectfully traversed.

Claim 13 recites that a plasma processing apparatus includes a ring member disposed to surround a periphery of a substrate to be processed. Further, a ratio of impedance per unit area of the ring member to that of the substrate is equal to or less than about 5.

Dhindsa, however, does not make mention of an impedance of a ring member at all. Accordingly, Applicants respectfully submit that Claim 13 patentably distinguishes over Dhindsa for at least the reasons discussed above.

TRAVERSAL OF OBVIOUSNESS REJECTIONS

Regarding the rejection of Claims 2-8, 15-17, and 20 as obvious over Hoffman, that rejection is respectfully traversed.

Claims 2-8 depend from amended independent Claim 1, and Claims 15-17 depend from amended independent Claim 14. Accordingly, Applicants respectfully submit that dependent Claims 2-8 and 15-17 patentably distinguish over Hoffman for at least the same reasons discussed above regarding amended independent Claims 1 and 14.

Claim 20 recites that focus ring includes a ring member disposed to surround a periphery of a substrate to be processed. Further, a ratio of impedance per unit area of the ring member to that of the substrate is equal to or less than about 5.

Hoffman makes no mention of an impedance of a focus ring, much less the specific ratio recited in independent Claim 20. Thus, Applicants respectfully submit that Claim 20 patentably distinguishes over Hoffman for at least the reasons discussed above.

Regarding the rejection of Claims 2-8, 15-17, and 20 as obvious over Dhindsa, that rejection is respectfully traversed.

As discussed above, amended independent Claims 1 and 14 patentably distinguish over Dhindsa. Accordingly, Claims 2-8 and 15-17, depending directly or indirectly from one of Claims 1 and 14, patentably distinguish over Dhindsa for at least the same reasons as amended independent Claims 1 and 14 do.

Regarding independent Claim 20, Dhindsa fails to disclose any impedance of a ring member, much less the specific ratio of impedance per unit area of the ring member to that of the substrate recited in Claim 20. Accordingly, Applicants respectfully submit that Claim 20 patentably distinguishes over Dhindsa for at least the reasons discussed above.

Regarding the rejection of Claims 9 and 18 as obvious over either Hoffman or Dhindsa in combination with Tong, that rejection is respectfully traversed by the present response.

Claim 9 depends from amended independent Claim 1. Claim 18 depends from amended independent Claim 14. Accordingly, Claims 9 and 18 patentably distinguish over Hoffman and Dhindsa for at least the same reasons discussed above regarding amended independent Claims 1 and 14.

Tong fails to remedy the deficiencies of Dhindsa noted above in the discussion of the rejection of Claims 1 and 14. For example, Tong does not describe a ring member directly disposed on the susceptor to surround a periphery of the substrate when the substrate is mounted on the electrostatic chuck. Rather, Tong describes a ring (108) which rests on top ring (110) instead of on a susceptor. Thus, Applicants respectfully submit that no reasonable

combination of Dhindsa and Tong would include all of the features of either of amended independent Claims 1 and 14. Accordingly, Applicants respectfully submit that Claims 9 and 18 patentably distinguish over the cited references for at least the same reasons discussed above regarding amended independent Claims 1 and 14.

CONCLUSION

For the foregoing reasons, it is respectfully submitted that this application is now in condition for allowance. A Notice of Allowance for Claims 1-21 is earnestly solicited.

Should Examiner Macarthur deem that any further action is necessary to place this application in even better form for allowance, Examiner Macarthur is encouraged to contact Applicants' undersigned representative at the below listed telephone number.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Steven P. Weihrouch
Attorney of Record
Registration No. 32,829

Customer Number

22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 03/06)

Lee L. Stepina
Registration No. 56,837